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RESEARCH ARTICLE

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# Global and Regional IUCN Red List Assessments: 4

Fenu Giuseppe[1], Ferretti Giulio[2], Gennai Matilde[2], Lahora Agustín[3], Mendoza-Fernández Antonio J[3], Mota Juan[3], Robles Jesús[4], Serra Lluís[5,6], Schwarzer Hedwig[7], Sánchez-Gómez Pedro[8], Viciani Daniele[2], Orsenigo Simone[9]

**1** *Centre for the Conservation of Biodiversity (CCB), Department of Life and Environmental Sciences, University of Cagliari, Cagliari, 09123, Italy* **2** *Department of Biology, University of Florence, Via La Pira 4, 50121 Florence, Italy* **3** *Departamento de Biología y Geología-CECOUAL, Universidad de Almería, Ctra. Sacramento s/n, 04120, Almería, Spain* **4** *Oficina de Impulso Socioeconómico del Medio Ambiente-OISMA, Consejería de Agua, Agricultura y Medio Ambiente - Comunidad Autónoma de la Región de Murcia, Plaza Juan XXIII, 30157, Murcia, Spain* **5** *Generalitat Valenciana, Conselleria d'Agricultura, Medi Ambient, Canvi Climàtic i Desenvolupament Rural, SS.TT. d'Alacant, C/ Churruca, nº 29, 03071, Alicante, Spain* **6** *Estación Científica Font Roja Natura, Universidad de Alicante, Ctra. de San Vicente del Raspeig s/n, 03690, San Vicente del Raspeig, Alicante, Spain* **7** *Jardín Botánico El Albardinal, Consejería de Medio Ambiente y Ordenación del Territorio, Junta de Andalucía, C/ Fundición s/n, 04115, Níjar, Spain* **8** *Departamento de Biología Vegetal, Universidad de Murcia, Avda. Teniente Flomesta, nº 5, 30003, Murcia, Spain* **9** *Department of Agricultural and Environmental Sciences - Production, Landscape, Agroenergy, University of Milan, Milan, 20122, Italy*

Corresponding author: *Fenu Giuseppe* (gfenu@unica.it)

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## Abstract

In this contribution, the conservation status assessments of three vascular plants are presented following to IUCN categories and criteria. It includes the assessment at global level of *Saxifraga caprariae* Mannocci, Ferretti, Mazzoncini & Viciani and *S. montis-christi* Mannocci, Ferretti, Mazzoncini & Viciani and the regional assessment of *Halocnemum cruciatum* (Forssk.) Tod. (Spain).

## Keywords

Conservation, extinction risk, IUCN protocol, threats

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## How to contribute

The text of the global and regional assessment should be submitted electronically to Simone Orsenigo (simone.orsenigo@unimi.it) or to Giuseppe Fenu (gfenu@unica.it); text up to 8000 characters in length (space included) must include a distribution map and a picture of the assessed species.

## Red List assessments

*Saxifraga caprariae* Mannocci, Ferretti, Mazzoncini & Viciani

Global Assessment
**Taxonomy and nomenclature**
**Order:** Saxifragales **Family:** Saxifragaceae

*Saxifraga caprariae* Mannocci, Ferretti, Mazzoncini & Viciani, Phytotaxa 284: 122. 2016.

**Common name:** Sassifraga di Capraia (It); Saxifrage of Capraia (En).

**Geographic distribution range:** *S. caprariae* (Fig. 1) is endemic to Capraia, a small island in the Tuscan Archipelago, Italy (Fig. 2; Mannocci et al. 2016). The species was found in three separate sites: "Fondo" Spring, below "Sella dell'Acciatore"; upper northern part of "Vado della Peraiola", below "gli Stagnoli" near "Fosso del Calacone"; and on the northern slopes of Mt. Pontica, towards "Vado della Fenicia". In the *Herbariun Centrale Italicum* (FI) there are herbarium specimens collected in 1896 from Mt. Castello, another site on the island. *Saxifraga caprariae* appears to be not confirmed at Mt. Castello, since repeated field surveys have failed to find it, however it is possible that this subpopulation persists.

**Distribution:** Country of occurrence: Italy

**Biology:** *Plant growth form*: perennial (hemicryptophyte)

**Flowering time:** Early spring (March to April)

**Reproduction:** No information on pollination, dispersal strategy and seed germination is available.

**Habitat and Ecology:** *Saxifraga caprariae* grows on volcanic rocks, on cliffs mainly exposed northwards between 250 and 350 m a.s.l. Soil is often thin, scarce or almost nonexistent, with a vegetation mainly consisting of mosses, lichens and small ferns (Mannocci et al. 2016), belonging to the alliance *Linarion caprariae* Foggi et al. 2006 (Habitat Directive: 8220 "Siliceous rocky slopes with chasmophytic vegetation").

**Population information:** A rough count in the three subpopulations on Capraia in 2015 gave totals of around 400 mature plants, however the number of individuals could be underestimated, because the areas where the individuals grow are not easily accessible and the species was only recently described. There is no detailed information available on population dynamics and trends.

**Figure 1.** *Saxifraga caprariae* in "Fondo" Spring, below "Sella dell'Acciatore"; Capraia Island (Tuscan Archipelago). Photograph by M. Mannocci.

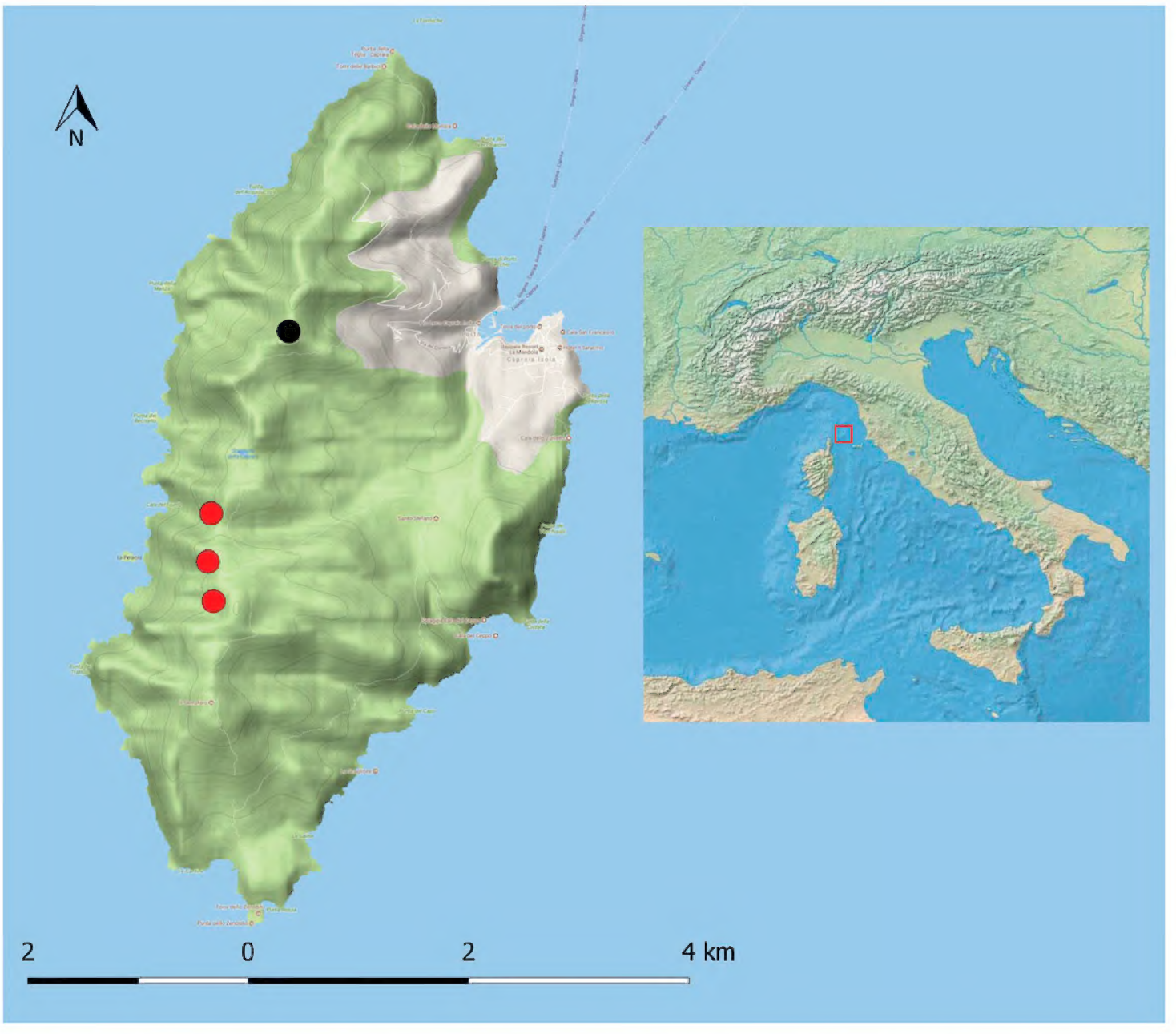


**Figure 2.** Geographic range and distribution map of *Saxifraga caprariae*. The red points in the map mark the current localities of occurrence, while the black one indicates an historical site.

**Threats:** 11.4 *Storms & Flooding*. Sporadic events of strong rainfalls could represent a threat, causing exceptional floods and landslides in the valleys where the species occurs.

**CRITERIA APPLIED:**

*Criterion B:* **EOO:** 4 km$^2$ calculated with minimum convex hull in QGis 2.14
**AOO:** 4 km$^2$ calculated with a 2 × 2 km cell fixed grid

a) The only plausible threat could be the sporadic events of exceptional rainfalls (more and more frequent due to climate change) causing floods and landslides with possible impacts on the subpopulations. Something similar could explain the reason why the species was not confirmed in the historical site of Mt. Castello.
b) The threat of sporadic heavy rainfall is not sufficient to expect a decline in AOO (ii), number of subpopulations (iv) or number of mature individuals (v).

*Criterion D:* Number of mature individuals: < 1000

**Red List category and Criteria (Global Assessment)**

| | | |
|---|---|---|
| **VU** | **Vulnerable** | D1 |

**Rationale for the assessment:** *Saxifraga caprariae* is an Italian endemic found only on Capraia Island. It occurs in three small sites on rocky volcanic cliffs. Although it has a restricted AOO and EOO, this plant is relatively well protected. The population comprises fewer than 1000 mature individuals. Based on the population size the species qualifies for listing as Vulnerable D1.

**Previous assessment:** *Saxifraga caprariae* was not evaluated (NE) previously (IUCN 2017).

**Conservation actions:** *Saxifraga caprariae* is not protected at regional, national or international level, due to the fact it was recently described (Mannocci et al. 2016). All the sites are included in the Capraia Island SAC (IT5160006 "Isola di Capraia"), which is also part of the Tuscan Archipelago National Park.

**Conservation actions needed:** further monitoring and research are recommended in order to better understand the population trends of the species.

Daniele Viciani, Giulio Ferretti, Matilde Gennai

## *Saxifraga montis-christi* Mannocci, Ferretti, Mazzoncini & Viciani

Global Assessment

**Taxonomy and nomenclature**

*Order:* Saxifragales *Family:* Saxifragaceae

*Saxifraga montis-christi* Mannocci, Ferretti, Mazzoncini & Viciani, Phytotaxa 284: 123. 2016

**Figure 3.** *Saxifraga montis-christi* in "Collo dei Lecci" Valley, Montecristo Island (Tuscan Archipelago). Photograph by L. Lazzaro.

**Common name:** Sassifraga di Montecristo (It); Saxifrage of Montecristo (En).

**Geographic distribution range:** *Saxifraga montis-christi* (Fig. 3) is endemic to Montecristo, a small island in the Tuscan Archipelago, Italy (Fig. 4; Mannocci *et al.* 2016), where it is known from two sites, "Collo dei Lecci" Valley and "Collo di Fondo" Valley. In the *Herbariun Centrale Italicum* (FI) there are specimens collected in 1965 from another site on the island, between "Convento" and "Monte della Fortezza". Recent field surveys have failed to find the species in the latter site, but we cannot exclude the possibility that it may persist there.

**Distribution:** Country of occurrence: Italy

**Biology:** *Plant growth form:* perennial (hemicryptophyte)

**Flowering time:** Early spring (March to April)

**Reproduction:** No information on pollination, dispersal strategy and seed germination is available.

**Habitat and ecology:** *Saxifraga montis-christi* grows on acid igneous rocks, on cliffs mainly exposed northwards between 200 and 550 m a.s.l. Soil is often thin, scarce or almost nonexistent, with a vegetation mainly consisting of mosses, lichens and small ferns (Mannocci et al. 2016), belonging to the alliance *Linarion caprariae* Foggi et al. 2006 (Habitat Directive: 8220 "Siliceous rocky slopes with chasmophytic vegetation").

**Population information:** The species occurs on steep cliffs which are difficult to access. The total population is estimated to be fewer than 1,000 mature individuals. There is no detailed information available on population dynamics and trends.

**Threats:** 11.4 *Storms & Flooding*. It is possible to hypothesize that sporadic heavy rainfall events could lead to high flow in streams, resulting in landslides, in the small

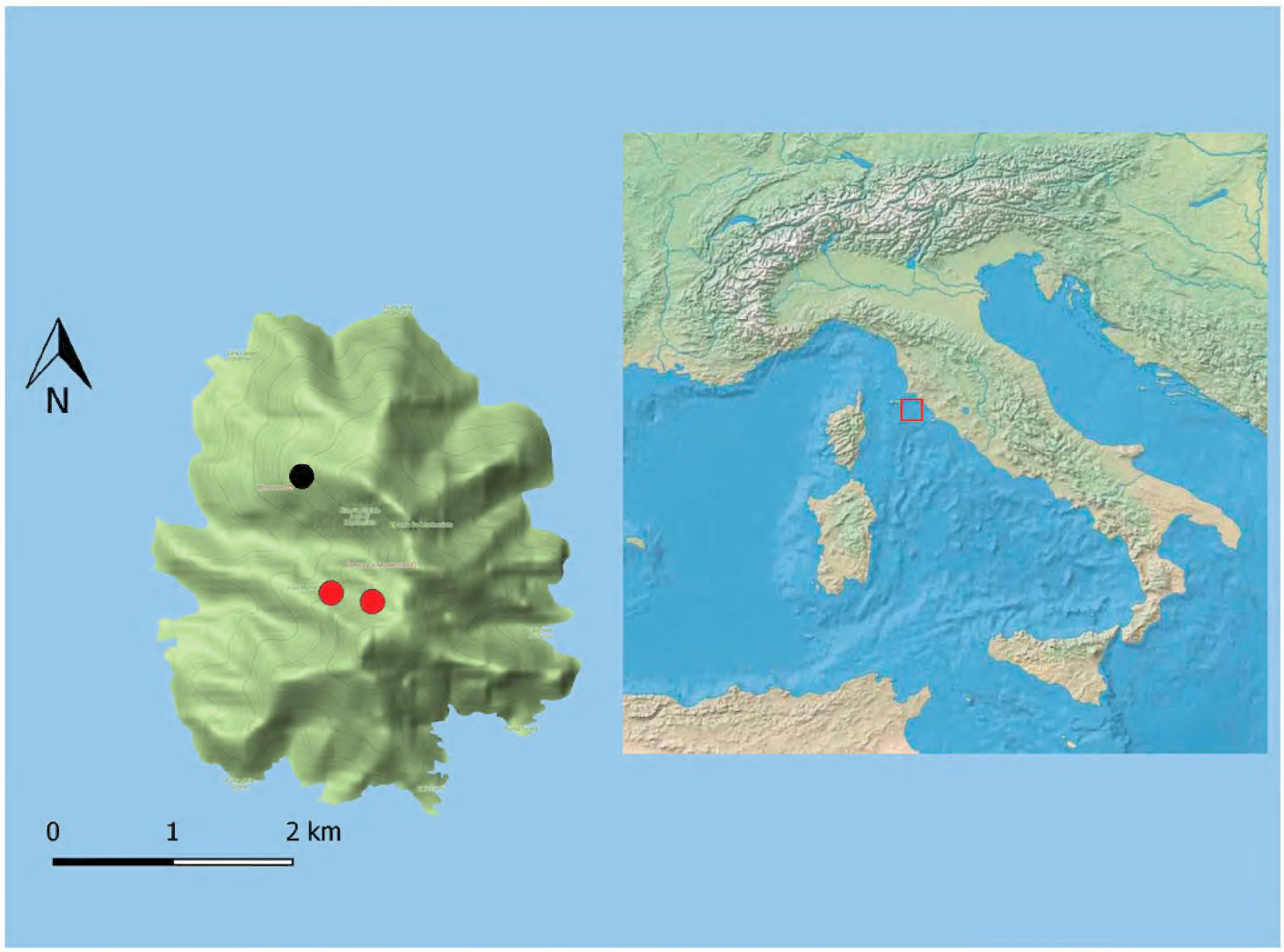


**Figure 4.** Geographic range and distribution map of *Saxifraga montis-christi*. The red points mark the current localities of occurrence; the black point indicate the historical sites.

narrow valleys where this species occurs and this could constitute a threat to some subpopulations.

**CRITERIA APPLIED:**

*Criterion B*: **AOO:** 4 km$^2$ calculated with a 2 × 2 km cell fixed grid

a) The species occurs on the largely inaccessible cliffs, inside a protected area, therefore the only plausible threat could be the sporadic events of exceptional rainfalls (more and more frequent due to climate change) causing floods and landslides with possible impacts on the subpopulations. Something similar could explain the reason why the species was not confirmed in the historical site between "Convento" and "Monte della Fortezza".

b) The threat of the sporadic heavy rainfall events is not sufficient to expect a decline in AOO (ii), number of subpopulations (iv) or number of mature individuals (v).

*Criterion D*: Number of mature individuals: < 1000

**Red List category and Criteria (Global Assessment)**

| | | |
|---|---|---|
| **VU** | **Vulnerable** | D1 |

**Rationale for the assessment:** *Saxifraga montis-christi* is an Italian endemic species that is known only on Montecristo Island in the Tuscan Archipelago. It occurs in two

small barely accessible sites on volcanic rocky cliffs in an uninhabited island, inside a National Park. The total number of mature individuals is fewer than 1,000. It is therefore assessed as Vulnerable D1.

**Previous assessment:** *Saxifraga montis-christi* was not evaluated (NE) previously (IUCN 2017).

**Conservation actions:** As it was only recently described (Mannocci et al. 2016), *Saxifraga montis-christi* is not protected either at the regional, national or international level. Montecristo Island is an Integral Natural Reserve within the Tuscan Archipelago National Park. All the sites are included in the Montecristo Island SAC (IT5160014 "Isola di Montecristo").

**Conservation actions needed:** Further monitoring and research are recommended in order to better understand the population trends of the species.

Daniele Viciani, Giulio Ferretti, Matilde Gennai

## *Halocnemum cruciatum* (Forssk.) Tod.

Regional assessment (Spain)
**Taxonomy and nomenclature**
*Order:* Caryophyllales *Family:* Amaranthaceae

*Halocnemum cruciatum* (Forssk.) Tod. in Nuovo Giorn. Bot. Ital. 5(3): 159 (1873)
≡ *Salicornia cruciata* Forssk., Fl. Aegypt.-Arab.: 2 (1775) ≡ *H. strobilaceum* var. *cruciatum* (Forssk.) Moq. in DC., Prodr. 13(2): 149 (1849)
= *H. strobilaceum* auct. non (Pall.) M. Bieb., Fl. Taur.-Caucas. 3: 3 (1819)

**Common name:** Garbancillo (Sp), Hamd jointed glasswort (En), حمد أحمر، غادنه (غادّنه) (Ar).

**Geographic distribution range:** *Halocnemum cruciatum* (Fig. 5) is distributed throughout the Mediterranean Basin and Arabian Peninsula. The Spanish population is divided into three areas in the semi-arid provinces of SE Spain (Fig. 6). It was first collected in the province of Almeria by Losa & Rivas-Goday (1968) and it still occurs at two sites on the coastal salt marshes in San Juan de los Terreros and Pozo del Esparto, which are separated by 3.5 km. Two additional subpopulations persist in Murcia, one in Calarreona, very close to the Almeria populations (4.5 km), and another in Saladares del Guadalentin. In El Almarjal and Cabo de Palos, where it was discovered by Jiménez Munuera (1909), this plant was considered extinct. There are recent introductions in the salt marshes in Lo Poyo and Cotorrillo in San Pedro del Pinatar. In Alicante, Rigual (1968) cited it in Saladares de Albatera, Balsares del Altet, El Hondo de Crevillente, Salinas de La Marina and the surroundings of Pantano de Elche and the Vinalopo riverbed. Currently, it only exists in El Hondo and Salinas de Santa Pola; it has also disappeared from Clot de Galvany (Serra 2007).

**Figure 5.** *Halocnemum cruciatum* photographed in San Juan de los Terreros (Almería, Spain, photograph by A. Lahora, on the left) and in El Hondo (Alicante, Spain, photograph by L. Serra, on the right).

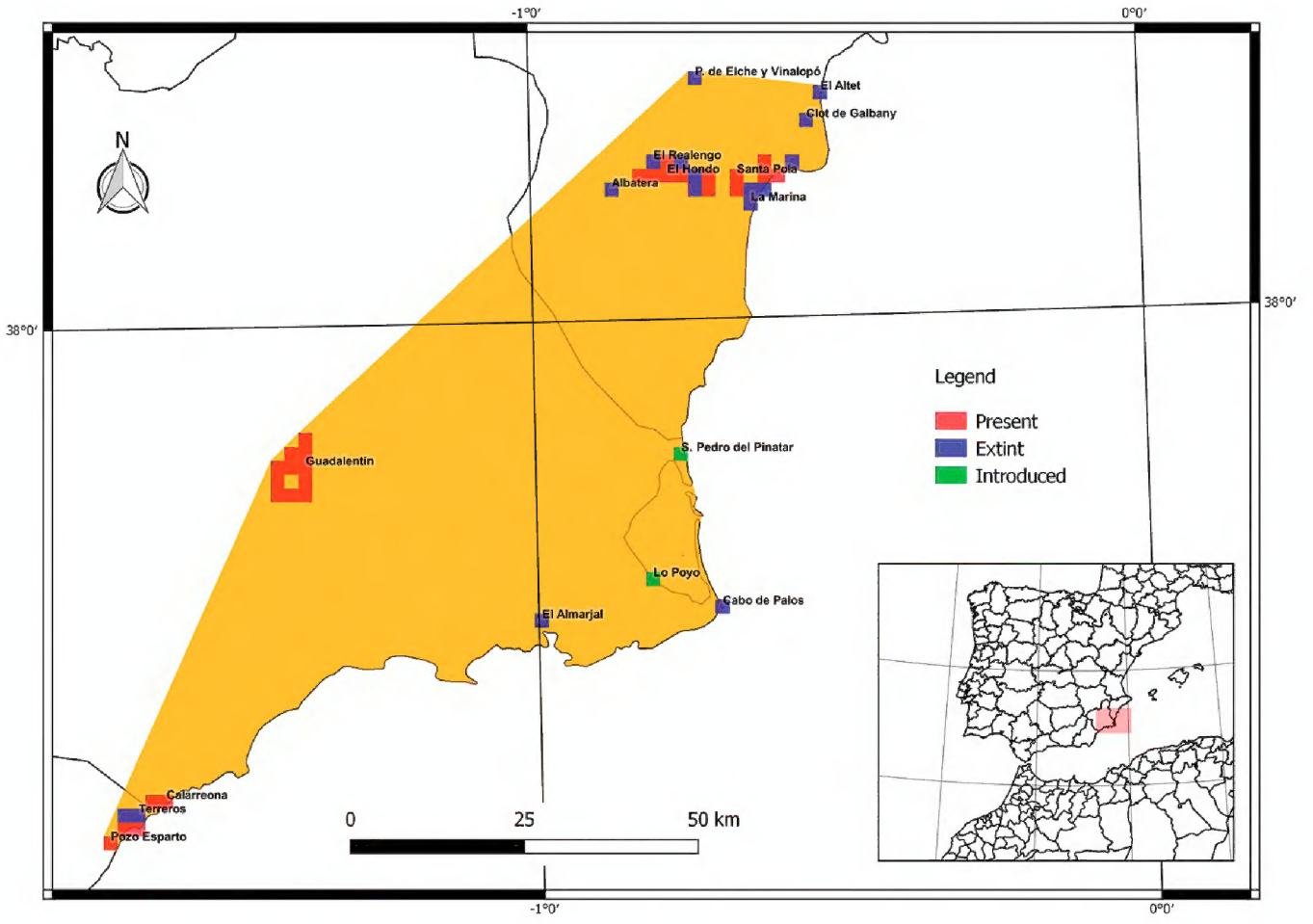


**Figure 6.** Extent of Occurrence (orange) and Area of Occupancy (2 × 2 km cell grid) of *Halocnemum cruciatum* in Spain.

**Distribution:** Countries of occurrence: Algeria, Cyprus, Egypt, Israel, Italy, Jordan, Lebanon, Libya, Morocco, Saudi Arabia, Spain, Syria, Tunisia, Turkey and United Arab Emirates.

**Biology:** *Plant growth form:* perennial (nanophanerophyte).

**Flowering and fruiting time:** Flowering from August to September, fruiting from September to November.

**Reproduction:** By seed and vegetative propagation. Wind-pollinated. Seeds have no dispersal structures and germinate in the wet season (Pujol et al. 2001, Estrelles et al. 2015).

**Habitat and Ecology:** Xerohalophyte (hyper-halophyte), growing on the margins of coastal and inland thermophilic salt marshes, on soils with high salt concentrations of the *Frankenio corymbosae-Halocnemetum cruciati* association (Biondi et al. 2013).

**Population information:** In Almeria, 2,455 mature individuals were counted in 2004; the number declined to 220 and 201 individuals in 2006 and 2015, respectively, due to habitat destruction. In Murcia, the counts conducted in Calarreona in 2006 showed an approximate number of 1,500 individuals, even though there has been a continuous regression due to a loss of habitat quality related to the watertable increase; thus, the species only survives on the wetland margins. In the Guadalentin subpopulation, a direct count was made in 2015, with a total of 5,789 individuals; however, much of the original area was degraded and occupied by agricultural activities. In Alicante, the total number of individuals is much higher, although it has a scattered distribution and many patches have been lost due to habitat transformation for crops, urbanization or infrastructure. It has even been affected within protected natural areas by an increase in the duration of flood irrigation to favour the presence of birds. In Murcia, translocations and plantations have been carried out, with a survival rate higher than 90%.

**Threats:** *1.1 Housing & Urban areas*: there is strong urban pressure on the coast.

*1.2 Commercial & Industrial Areas:* in Guadalentin and Albatera the habitat has been occupied by industrial estates.

*1.3 Tourism & recreation areas:* part of the coastal populations has been affected by resorts, golf courses, car parks and camping areas.

*2.1 Annual & Perennial Non-Timber Crops:* in Guadalentin and El Hondo, agriculture has occupied part of the species' habitat.

*2.3 Livestock Farming & Ranching:* the Guadalentin subpopulation is affected by cattle trampling.

*4.1 Roads & Railroads:* all the subpopulations are located alongside roads or highways.

*6.1. Recreational activities:* tourism damages coastal populations, especially in the summer.

*7.2 Dams & Water Management/Use:* The *Halocnemum* halophytic vegetation has been replaced in some areas by formations of *Phragmites*, *Sarcocornia*, etc., due to changes in water flow patterns from their natural range.

*9.4 Garbage & Solid Waste:* There is dumping of debris and garbage in the salt marshes.

**CRITERIA APPLIED:**

*Criterion A:* There has been a more than 80% decrease in population size over the last 30 years which continues today. Both AOO and EOO have been reduced with destruction and loss of habitat quality.

**Red List category and Criteria (Regional Assessment)**

| Critically Endangered | CR A2ac |
|---|---|

**Rationale for the assessment:** In Spain, *Halocnemum cruciatum* is restricted to three severely fragmented subpopulations. There has been a continuous decrease in population size, which currently continues, a reduction of AOO, and EOO and a loss of suitable habitats. Generation time is estimated at 10-12 years. The EOO (calculated with minimum convex polygon in QGIS 2.18) has declined from 4,480 km$^2$ to 3,614 km$^2$. The AOO (calculated with a 2 × 2 km cell fixed grid) has decreased from 180 km$^2$ to 112 km$^2$ in the last 30 years. Populations are threatened by urban, residential and industrial developments, roads, agriculture and cattle. Some patches are also affected by modification of flooded areas and waste dumping. For this reason, this plant is considered as Critically Endangered at a regional level (Spain).

**Previous assessment:** Critically Endangered [CR A2ac; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C2a(ii)b] in Moreno Saiz (2009) at a national level (Spain).

**Conservation actions:** *Halocnemum cruciatum* is protected at the regional level in Andalusia (23/2012 Decree), Murcia Region (50/2003 Decree) and Valencian Community (6/2013 Order). The *Halocnemum* vegetation is included in Annex I of the Habitats Directive, Mediterranean and thermo-Atlantic halophilous scrubs (code 1420). Much of Murcia's and Alicante's subpopulations are within natural protected areas.

**Conservation actions needed:** Protection of the patches in Andalusia. Habitat management and restoration. Seed collection and conservation in botanical gardens. Population reinforcement and reintroduction.

**Notes:** Recent taxonomic investigations confirm that *H. cruciatum* is a separate species from *H. strobilaceum* (Pall.) M.Bieb. (Piirainen et al. 2017).

Lahora Agustín, Mendoza-Fernández Antonio J., Robles Jesús, Serra Lluís, Schwarzer Hedwig, Sánchez-Gómez Pedro, Mota Juan.

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